Suggested Guidelines & Resources for Test Writing

The following testing resources were originally developed by the Ohio Envirothon, Ohio Department of Natural Resources – Division of Soil & Water Conservation, and Canon Envirothon Testing Subcommittee. The information below was adapted and included in this *Organizational Guide & Resource Kit* to assist your State/Provincial Envirothon program with the preparation of quality test questions.

Suggested Testing Guidelines

1. Two resource professionals from each of five content areas will be asked to develop test questions. The content areas include soils/land use, aquatic ecology, forestry, wildlife, and a current environmental issue (CEI) designated for that year's Canon Envirothon.

2. In addition to assessing the teams' knowledge of specific facts, questions should provide hands-on opportunities for students to manipulate equipment and demonstrate life-long learning skills.

   See *Suggestions for Site Specific and Hands-on Questions,* on page 78 of this kit.

3. Test questions should be submitted directly to the State/Provincial Envirothon Committee early each spring (e.g., April 1). The questions will be reviewed and compiled into educationally-sound tests for each testing station. All tests will be sent out to each of the test writers prior to the competition for final review.

4. On competition day, presenters may give an introduction to each group of students before they begin taking the test. The introduction could include career background and pertinent testing information. To ensure the same information is given to each team, the introduction should be written on note cards and read aloud to the students.

5. A volunteer or natural resource professional will serve as a monitor for each station. He or she will serve as timekeeper and help assure fairness for all participating teams.

6. Test writers are not permitted to answer any test-related questions asked of them by any Envirothon team or advisor prior to or during the competition.

7. Test writers for the State/Provincial Envirothon should not prepare tests for the area/regional level during the same year as they prepare questions for the state/provincial competition. In addition, they should not present special training sessions for any individual teams or groups of teams.

8. Teams will receive a copy of the tests and answer keys in their exit packets at the end of the State/Provincial Envirothon competition.

Additional Guidelines for Eco Station Tests

In addition to the guidelines above, the following guidelines are suggestions for those states/provinces using eco station tests.

Test sites will be chosen to facilitate an eco-station format, in which questions from each of the five content areas will be included at each eco-station test site. Each of the five eco-stations will have a primary focus on one of the five content areas, e.g. the "forest-meadow edge" site might focus on wildlife, although soils, forestry, aquatic ecology, and current environmental issue questions will also be included.

2. Choose one of the following two recommendations for test writing:

   a. Natural resource professionals (test writers) from each of the content areas should provide 15-20 questions for the eco-station with their primary focus, and 5-7 questions for each of the other eco-stations.

   b. Natural resource professionals (test writers) work collaboratively to write the tests for all sites. Each individual prepares 30-35 questions for each site.

Recommendations for Writing Multiple Choice Questions

As you are developing test questions for the Envirothon competition, please keep in mind that one of the primary goals of the Envirothon is to increase environmental literacy among participants. The Envirothon program seeks not only to increase each student's level of environmental knowledge, but also encourages the development of skills needed to analyze and apply information.

Refer to the Canon Envirothon *Goals and Objectives* when formulating questions (see page 8 of this kit). Check off those objectives you feel are most important, add others, and develop questions related to those key points.

Multiple choice questions should involve a statement or question (the "stem"), followed by several alternative responses. One of these responses is the answer; the others are distracters. Typically, there should be a maximum of 5 alternative responses, especially if the tests will be graded electronically.

Multiple choice questions allow the instructor to:

- Evaluate learning in any content area;
- Evaluate learning at all cognitive levels;
- Grade more easily (e.g., electronically);
- Assess more content information in a shorter period of time;
- Reduce ambiguity and decrease the chance of scoring bias; and
- Prepare learners for standardized tests.

On the negative side, multiple choice questions are difficult and time consuming to construct, especially when assessing higher levels of thinking. Moreover, they do not evaluate how well students are able to communicate their understanding. However, in situations where large numbers of test must be graded in a short period of time, multiple choice questions serve as the best form of testing.

Guidelines for Question Development

The stem should not be written in the form of an unfinished sentence. It should be meaningful by itself and ask a question (i.e., who, what, where, when, why, how, or which) or present a problem.

2. Avoid using negative questions or statements in the stem or response. These types of questions tend to be ambiguous and confusing.

3. Do not give grammatical clues to the correct answer. For example, using the article "a" or "an" at the end of a stem indicates whether the answer starts with a vowel or consonant.

4. Write stems that have only one correct answer, but make the distracters plausible.
   - Write the correct response first and then generate 3-4 reasonable alternatives.
   - Write alternative responses of roughly equal length and parallel construction.
   - Arrange the alternative responses in alphabetical order to avoid establishing a pattern.

5. Use the responses "all of the above" or "none of the above" sparingly or not at all.

6. Place the entire item (stem and alternative responses) on the same page. Use upper case letters before each of the responses.

7. Make a deliberate effort to stress comprehension, application, analysis, synthesis, and evaluation when you write questions. Guard against writing too many knowledge-level questions. (See **Bloom's Taxonomy**).

See multiple choice test question examples on the following page.

Guideline	Weak Question	More Effective Question
1. The stem should not be written in the form of an unfinished sentence. It should be meaningful by itself and ask a question or present a problem.	The natural soil drainage class of this soil is: A. Excessively well drained B. Well drained C. Well drained, wet substratum D. Somewhat poorly drained E. Poorly drained	Soil drainage classification is a method of indicating how well water moves off the surface or through the soil. Which of the following best describes this soil's natural soil drainage class? Same answer choices
2. Avoid using negative questions or statements in the stem or response, they tend to be ambiguous and confusing.	Which swan is not considered to be a true wild swan but an exotic bird? A. Mute Swan B. Trumpeter Swan C. Tundra Swan D. None of the above	Which swan is considered to be an exotic bird rather than a true wild swan? A. Mute Swan B. Trumpeter Swan C. Tundra Swan D. Whistling Swan
3. Do not give grammatical clues to the correct answer.	The tree marked with a red flag is an: A. Norway Spruce B. Austrian Pine C. White Pine D. Pin Oak	Identify the tree marked with the red flag from the list below. Same answer choices
4. Write stems that have only one correct answer, but make the distracters plausible.	Now found in every county in Ohio, this common predator has extended its range to the east coast in recent years. A. Polar bear B. Alligator C. Coyote D. Lion	What common predator, now found in every county in Ohio, has extended its range to the east coast in recent years? A. Badger B. Black bear C. Coyote D. Marmot
5. Use the responses "all of the above" or "none of the above" sparingly or not at all.	The material that is the biggest money-maker in recycling is: A. Aluminum cans B. Paper C. Glass D. All of the above E. None of the above	What material is the biggest money-maker in community recycling programs? A.Aluminum cans B. Glass C. Paper D. Plastic

6. Place entire question on the same page. Use upper case letters to distinguish responses.	Question in which several answers are listed on following page. Lower case letters used to distinguish responses.	Entire question is contained on single page. Upper case letters used to distinguish responses.
7. Make a deliberate effort to stress higher level thinking skills.	The soil at this site has developed from which of the following? A. Bedrock B. Glacial outwash C. Lacustrine sediments D. Glacial till	If a septic tank absorption field were installed at this site, which soil feature would be most restrictive and likely to cause groundwater pollution problems? A. Depth to bedrock B. Seasonal wetness or drainage C. Slow subsoil permeability D. Underlying sand and gravel

Suggestions for Site-Specific & Hands-On Questions

Soils/Land Use

- Identify landform at site
- Determine permeability of soil
- Identify drainage class, depth to bedrock, depth of rooting
- Measure thickness of topsoil, subsoil
- Analyze soil structure and texture
- Using a soil survey:
  - Identify hydrologic soil group
  - Analyze chemical properties of soil
  - Estimate erosion potential
  - Identify soil mapping unit
  - Evaluate soil type for its suitability for crops and pasture, woodland productivity, wildlife habitat, recreation, building site development, and sanitary facilities

Aquatic Ecology

- Assess water quality using a pH meter, secchi disk, turbidity tube, thermometer, chemical test kits, etc.
- Identify macroinvertebrates taken from a stream or pond using a key or field guide
- Compare water samples taken from different parts of wetlands or ponds
- Make inferences about species diversity based on water quality tests or measurements
- Complete a portion of a wetlands determination form
- Assess physical components of a stream using a stream reach screening tool
- Identify existing non-point source management practices in use at a specific site and/or make recommendations for implementing new or improved management practices
- Use hand lenses, microscopes and field guides to identify plankton or alga samples

Forestry

- Identify common trees without a key and unusual species through the use of a key
- Use appropriate tools and measuring devices to determine tree diameter and height, log measurement, available board feet, crown spread, and cordwood volume
- Use appropriate charts and tables to calculate the number of feet per acre needed for planting at any given spacing
- Use a current timber price list to calculate stumpage value of specific trees
- Use aerial photos to compare land use changes over time

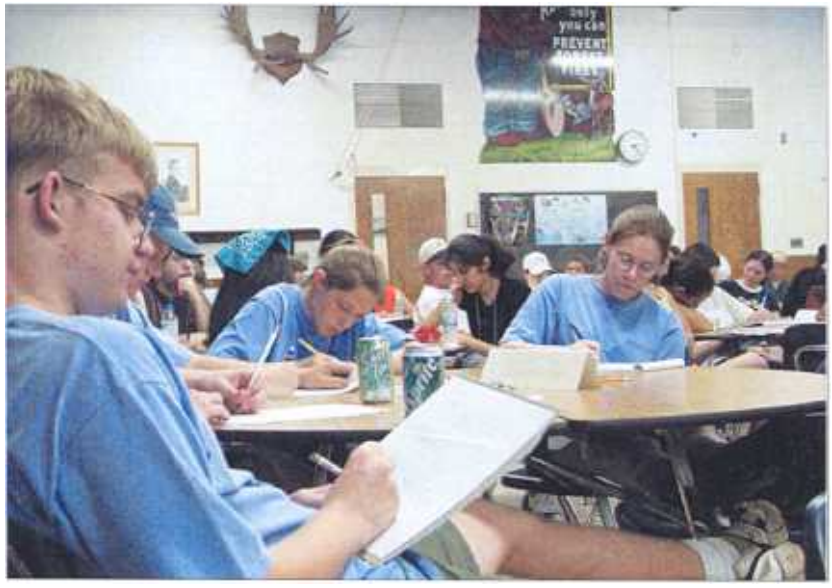
Wildlife

- Assess suitability of habitat for given wildlife species
- Suggest management practices for the site that would improve the habitat for a given range of species
- Identify wildlife signs
- Cite examples of food chains based on specific site conditions
- Analyze site factors that limit or enhance population growth
- Interpret the significance of habitat alteration due to on-site human impacts
- Evaluate factors that might upset ecological balance at the site
- Use field guides to identify wildlife by their tracks, skull, pelts, etc.
- Interpret how the presence of wildlife might serve as an indicator of environmental quality

Resources/Materials Used for Testing

The following resources and equipment may be used to enhance the testing experience:

- Calculators
- Compasses
- Tree measuring equipment
- Hand Lenses
- Microscopes
- Slope determination cards
- Biological monitoring equipment (e.g., kick seines, dip nets, trays, buckets, forceps, etc.)
- Leaf Identification Key to Trees
- Top Maps
- Ground water pollution potential maps
- Ground water resources maps
- Glacial map
- Physiographic regions map
- Water quality monitoring equipment (e.g., turbidity tubes, secchi disk, pH strips, thermometers, chemical test kits, etc.)
- Soil surveys
- Exhibit signs on stakes to identify specific trees, areas, or exhibits for individual questions



State/Provincial Envirothon Sample Tests

The following sample tests were provided by the Mississippi, Nova Scotia, and Prince Edward Island Envirothon programs. These tests should provide you with a general idea of the concepts tested at each station.

The examples on the following pages provide examples of both multiple choice and short answer questions. While a combination of these two test formats may be ideal for preparing teams to compete at the Canon Envirothon, each state or province should determine a testing format to meet their specific needs and objectives.

Please note the following features of these sample tests:

1. Focus on the Canon Envirothon learning objectives.

2. The potential for a state/provincial Envirothon program to tailor their questions to test information specific to their region.

3. The incorporation of site-specific questions (i.e., at each testing station).

4. The incorporation of questions that require a hands-on approach and/or equipment, resource materials, etc. (e.g., identification, measurements, use of maps, etc.)

Compare these tests to those used at the Canon Envirothon (see *Canon Envirothon Sample Tests* on page 43 of this kit).

State/Provincial Envirothon
Soils/Land Use Sample Test

Field Excercises - Soil Pit

1. What is the general color of the A horizon in this soil profile?

2. Why is the A horizon this color?

3. What is the name of the dominant process which has resulted in the formation of this A horizon?
    A. Weathering
    B. Humus Incorporation
    C. Leaching/Eluviation
    D. Gleying

4. What is the texture class of the A horizon in this profile?

5. Based on your inspection of the soil profile and the overall site, what would you say is the drainage class of this soil/site?
    A. Rapid
    B. Well
    C. Imperfect
    D. Poor Explain

Written Excercises

. Indicators of soil quality are categorized into four general groups:
    A. land use, organics, saturation, physical
    B. color, chemical, texture, microbial
    C. biological, color, physical, organics
    D. visual, physical, chemical, biological

2. As annual rainfall increases, soil pH:
    A. increases
    B. decreases
    C. is unaffected

3. Upon surveying a site, there is an over-abundance of laurel bushes. What inference can you make about the soil?
    A. the soils is acidic
    B. the soil is a loam
    C. the soil has been undisturbed for the past 100 years
    D. all of the above

4. A community is expanding. As development occurs, housing, jobs, community attractions and shopping centers are needed. A plot of pasture land outside of town is for sale. A soil survey reveals a colluvial soil with a fragipan at 12 inches. What is the best use for this land?
    A. community park
    B. housing development
    C. shopping mall
    D. factory

5. During saturation, the rusty brown iron coating on mineral particles is reduced to a grey color. The combination of gray and brown colors is called:
    A. tilth
    B. mottling
    C. ronning
    D. stripping

6. Prime farmland would most likely be identified as capability class:
    A. I
    B. VIII
    C. AI
    D. A

7. Which of the following is not a major soil forming factor:
    A. Time
    B. Parent material
    C. Climate
    D. Landscape position
    E. Biological factors
    F. None of the above
    G. All of the above

8. If a soil has a Munsell color notation of 7.5YR 5/6, the hue is:
    A. 5
    B. 6
    C. 5/6
    D. 7.5
    E. 7.5YR

9. Soil permeability is most greatly affected by:
    A. Soil structure
    B. Soil texture
    C. Soil compaction
    D. Soil organic matter content
    E. All of the above

10. According to the definition of soils, soils:
    A. are on landforms or landscape position
    B. form from geologic and/or organic materials
    C. have nearly vertical layers called horizons
    D. A and B are correct only
    E. None of the above

11. Which drainage class would be most likely to have a red matrix color?
    A. poorly
    B. well
    C. somewhat poorly
    D. all of the above

12. The presence of mottles in a soil is an indicator of:
    A. calcium concentrations
    B. earthworms in the soil
    C. old root channels
    D. impeded drainage

13. Which of the following essential nutrients is most easily leached from soils?
    A. potassium
    B. nitrogen
    C. phosphorous
    D. calcium
    E. magnesium

4. What is the most common water pollutant from farmland?
    A. pesticides
    B. nutrients
    C. soil sediments

5. A soil layer that is nearly parallel to the land surface and is different from other layers above and below it is called a soil _____.
    A. profile
    B. horizon
    C. ped
    D. taxa
    E. series

State/Provincial Envirothon
Aquatic Ecology Sample Test

Field Excercises

STATION 1 - Aquatic Critters

Look at Specimen A and answer the following questions based on your observations. Circle the correct word from the following pairs of words to complete the sentences.

This (amphibian, reptile) is in Nova Scotia and breeds (on land, in ponds) in the springtime. It lays its eggs in (water, mossy crevices). It is a (tiger salamander, yellow spotted salamander, or yellow belly lizard).

Look at both specimen A and specimen B and answer the following question.

Specimen B is a _____ _____ and is (rarer, more common) than specimen A.

STATION 2 - Fin identification and function

The fins on this model are labelled. Look at the fish model and write the name of the fin beside the correct label written below. Write the fin ID (name or letter) beside all functions that apply.

FIN	FUNCTION		
Fin Q	_____	_____	Horizontal or lateral balance and resting
	_____	_____	Propelling the fish through the water
	_____		Maintaining vertical balance and achieving quick changes in Direction
Fin T	_____		
Fin U	_____		Use is unknown
Fin V	_____		

STATION 3 - Create an aquatic food chain

Create an aquatic food chain using **six** of the samples provided. First, choose six samples then, identify them (e.g., sample 1 is a black duck; sample 10 is a water strider; etc). Second, write down its name in the order in which it fits into the aquatic food chain.

Written Excercises

1. Which of the following federal laws affect water quality in the United States?
   A. Safe Drinking Water Act
   B. Clean Water Act
   C. Federal Water Quality Initiative
   D. Both A and B
   E. Both B and C

2. Which of the following is the leading cause of water-borne illnesses in the United States?
   A. Coliform bacteria
   B. Giardia
   C. Iron bacteria
   D. Cryptosporidium

3. The main impact of water temperature on stream water quality is:
   A. heat will decrease the capability of water to hold dissolved oxygen
   B. spawning rates increase as water temperatures decrease (more reproduction)
   C. water has a low heat capacity, which makes it susceptible to changes in temperature
   D. most aquatic organisms cannot tolerate slow, gradual changes in temperature
   E. temperature has no impact on stream water quality or health

4. Which of the following organisms is a scavenger of dead freshwater fishes in Mississippi?
   A. grizzly bears
   B. Mississippi kite
   C. Bald eagle
   D. Wood duck

5. Water which comes from a well in the desert is usually associated with:
   A. water tables well below the desert floor.
   B. natural springs
   C. flash floods
   D. reservoirs

6. Which of the following insect orders is NOT known to have aquatic larvae?
   A. odonata
   B. mallophaga
   C. hemiptera
   D. diptera

7. Suspension feeders in the ocean often rely on which of the following for food?
    A. macroscopic brown algae
    B. plankton
    C. chemosynthesis
    D. dissolved oxygen

8. The native mammal that historically belongs in Mississippi waters, but has not been seen there in the greatest number of years is the:
    A. sperm whale
    B. killer whale
    C. west Indian manatee
    D. clymene dolphin

9. Which of the following species is MOST adapted for lying BURIED in mud or sand with just the tip of the nose extending from the water for respiration?
    A. common snapping turtle
    B. eastern river cooter
    C. southern painted turtle
    D. gulf coast spiny soft-shell

10. One of water's properties is its high heat of vaporization. What is the most likely explanation for that property?
    A. hydrogen bonds must be broken for water to evaporate
    B. hydrogen bonds require ionic bonding, which releases more heat
    C. water molecules have greater spacing in ice
    D. water molecules release heat when they form

State/Provincial Envirothon
Forestry Sample Test

Field Excercises

. What is the diameter of this tree at DBH?

2. Identify these three pieces of forest mensuration equipment.

3. Give four factors that would influence a land owner's decision to manage or harvest this stand.

4. What management and/or harvest options would you recommend for this stand and why?

5. Why can white spruce successfully re-colonize an abandoned old field while other tree species fail? (2 points)

Written Excercises

. Which of the following could reduce the susceptibility of a forest stand to insect attack?
   A. change species composition
   B. change stand structure
   C. increase species diversity
   D. all of the above

2. Managing forestland, including deciding not to apply any specific activities, affects neighboring land and people. If you owned a tract of forestland, which of the following values might a landowner consider before implementing an activity?
   A. future timber quality
   B. future species composition
   C. soil productivity
   D. appearance
   E. all of the above

3. Stands of trees that originated over a relatively short period of time, give or take 20 years, are called:
   A. all-aged stands
   B. pole stands
   C. even-aged stands
   D. intermediate stands

4. Which of the following factors can influence regeneration?
   A. harvesting method
   B. over-browsing by animals
   C. fire
   D. soil type
   E. all of the above

5. Trees that are under stress or slowly dying exhibit a range of symptoms, such as smaller leaves, dead branches in the crown, and shorter shoot growth. This probably means:
    A. respiration exceeds photosynthesis
    B. energy production exceeds transpiration
    C. photosynthesis exceeds respiration
    D. photosynthesis, respiration and transpiration are equal

6. For most tree root systems, the roots:
    A. transport water and nutrients
    B. provide structural support
    C. store starch
    D. all of the above

7. New growth occurs in this part of the tree:
    A. annual ring
    B. stoma
    C. cambium
    D. vein

8. Photosynthesis occurs in plants like grasses, sedges, and trees. The products of photosynthesis are:
    A. carbon dioxide and water
    B. water and sugar
    C.carbon dioxide and oxygen
    D. sugar and oxygen
    E. water and oxygen
    F. carbon dioxide and sugar

9. In forest measurement, a cord of wood is:
    A. a short-bed pick-up truck load
    B. a long-bed pick-up truck load
    C. a stack of wood measuring 2` X 8` X 16`
    D. a stack of wood measuring 128 cubic feet

10. The state tree of Mississippi is the:
    A. Pine
    B. Magnolia
    C. Dogwood
    D. Hemlock

1. A deciduous tree (is):
    A. undecided about where to grow
    B. loses its leaves in winter
    C. keeps its foliage all year
    D. grows in a wetland

12. A forester is about to write a management plan for a landowner, and is having a conference with him. What is the first question he should ask?
    A. What is the site index of your land?
    B. What is your income tax bracket?
    C. Which species of game animal do you want to manage for?
    D. What are your land-management goals and objectives?

13. Which of the following is an "introduced" or non-native of Mississippi?
    A. Live Oak
    B. Mimosa
    C. Sweet Bay
    D. Spruce Pine

4. The "woody" component of a tree is:
    A. xylem
    B. phloem
    C. cambium
    D. betulaceae

15. What is an old hollow snag best used for?
    A. paper making
    B. wildlife
    C. firewood
    D. nothing

State/Provincial Envirothon
Wildlife Sample Test

Field Excercises

1. Provide three values this dead standing (snag) tree offers to wildlife.

2. Based on this mount, describe the primary features which identify it as a predator.

3. Which of the following birds and mammals feed on the fruit and seeds of trees and shrubs near this station? (Mark all that apply)

    A. Ruffed Grouse
    B. Chickadee
    C. Blue Jay
    D. Beaver
    E. Northern Flicker
    F. Coyote
    G. Evening Grosbeak
    H. Chipmunk
    I. Tree Swallow

4. Based on a skull or skeleton, what type of animal (carnivore, herbivore, or omnivore) is this and what type of habitat would it usé and why?

5. Based on the contents of this stomach, what is the primary prey and likely habitat of this animal?

Written Excercises

1. Which of the following animals are crepuscular?
    A. Flying Squirrel
    B. Wild Turkey
    C. Black Bear
    D. Raccoon
    E. All of the above
    F. A and D but not B or C

2. Habitat fragmentation is detrimental to which of the following wildlife species?
    A. neotropical migrants
    B. brown-headed cowbird
    C. black bear
    D. all of the above
    E. A and B but not C
    F. A and C but not B

3. Which of the following provide funds for wildlife management?
   A. Pittman-Robertson Act
   B. duck stamps
   C. hunting license sales
   D. all of the above
   E. none of the above
   F. B and C but not A

4. Controlled burning benefits which of the following wildlife species?
   A. black bear
   B. white-tailed deer
   C. red-cockaded woodpecker
   D. all of the above
   E. A and B but not C
   F. B and C but not A

5. Of the 23 species of mussels in Mississippi that are listed as endangered by the state, 10 are or were found exclusively in which drainage system?
   A. Tennessee River
   B. Pearl River
   C. Pascagoula River
   D. Tombigbee River
   E. Mississippi River

6. Which of the following statements are true concerning the regulation of threatened and endangered plants?
   A. Mississippi has no state statues concerning threatened and endangered plants because plants are considered to be the property of the landowner.
   B. Threatened and endangered animals are given priority over threatened and endangered plants.
   C. Threatened and endangered plants are given priority over threatened and endangered animals.
   D. Threatened and endangered plants are regulated in the same manner as threatened and endangered animals.

7. Which of the following statements are true?
   A. An extirpated species exists in captivity but no longer exists in the wild.
   B. Extinction is always a direct result of human activities.
   C. Endangered species are in danger of becoming extinct throughout all or a significant portion of its range.
   D. Threatened species are in danger of becoming extinct in a specific portion of its range.
   E. All of the above

8. Which insect listed below is listed as endangered in Mississippi?
   A. Camp Shelby burrowing crayfish
   B. Mississippi Gulf Coast fritillary
   C. spicebush swallowtail
   D. zebra swallowtail
   E. American burying beetle

9.When black bears go dormant in the winter this is referred to as:
   A. torpor
   B. hibernation
   C. aestivation
   D. lethargy
   E. none of the above

10. What term do biologists use to describe when the lack of food, water, or shelter or hunting, pollution, disease, or predation prevents a particular wildlife population in an area from growing?
   A. carrying capacity
   B. competition
   C. limiting factor
   D. zero population growth
   E. compensatory loss

11. Which of the following statements are true concerning bears during winter dormancy?
   A. Winter dormancy is triggered by the lack of food.
   B. Bear cells break down and recycle the toxins produced by fat burning.
   C. Bears develop a fecal plug that prevents defecation.
   D. All of the above
   E. A and B but not C.

12. Name all of the poisonous snakes that are native to Mississippi?

13. Which of the following animals is **not** a marsupial?
   A. koala
   B. Tasmanian wolf
   C. opossum
   D. echidna
   E. wallaby

4. Which federal agency is responsible for enforcing regulations pertaining to most marine mammals and organisms listed as "endangered" under the Endangered Species Act?
   A. Environmental Protection Agency
   B. U.S. Fish and Wildlife Service
   C. National Park Service
   D. U.S.D.A. Forest Service
   E. National Marine Fisheries Service

5. Duck populations have declined in recent years. Which of the following factors contributed most to this decline?
   A. nest predators
   B. thinning of egg shells
   C. drought
   D. wetland destruction

State/Provincial Envirothon
Current Environmental Issue Sample Test

Introduced Species and Biodiversity

1. Biodiversity is the term used to represent.
    A. The interaction of exotic species with native species.
    B. The diversity of habitats that the biological community occupies.
    C. The diversity of life forms in a given area.
    D. The diversity of biotic and abiotic components in a specific habitat type.

2. Degraded soil quality
    A. Decreases the ability of invader plant species to compete with native species.
    B. Increases the ability of invader plant species to compete with native species.
    C. Has no effect on the ability of invaders to compete with native species.
    D. None of the above.

3. Which of the following statements are TRUE concerning introduced species?
    A. Most U.S. food crops and domesticated animal s are introduced, non-native species.
    B. Most invasions are a result of human activity.
    C. Invasions can occur naturally.
    D. All of the above.
    E. A and B are true, but not C.

4. In general, from where do the most serious invaders (those that can cause great harm to an environment) originate.
    A. A different habitat type than that being invaded.
    B. Long distances from the area of invasion.
    C. Short distances from the area of invasion.
    D. Areas where natural barriers to the invader have been removed.
    E. Same geographic region of the area being invaded.

5. For every 100 species that are intentionally or unintentionally introduced in to the U.S., what percent may become invasive and cause serious problems in their new environment?
    A. 1 percent
    B. 15 percent
    C. 30 percent
    D. 50 percent

6. Which of the following is true concerning the National Invasive Species List?
    A. The list contains over 1000 plants and animals.
    B. The list contains over 5000 plants and animals.
    C. Invasive species are grouped by region of occurrence.
    D. Invasive species are grouped by ecosystems impacted.
    E. None of the above.

7. Exotic fungal diseases have devastated which of these species over the last century?
   A. Bitter Pecan, Water Oak, Loblolly Pine
   B. Filbert, Hazelnut, Sweet Pecan
   C. American Elm, American Chestnut, Butternut
   D. None of the above

8. The means and routes by which invasive species are introduced are called what?
   A. Transport vectors
   B. Pathways
   C. Distribution mechanisms
   D. Detours
   E. Invasive vectors

9. Which of the following provides a blueprint for Federal action concerning invasive species?
   A. Executive Order 13112 on Invasive Species
   B. National Invasive Species Management Plan
   C. The Lacey Act
   D. Plant Protection Act in conjugation with Animal Quarantine Laws
   E. The Invasive Plant and Animal Species Prevention Act of 1999

10. How long can some weed seeds remain dormant in the soil?
   A. 1 to 2 years
   B. 5 to 10 years
   C. 10 to 20 years
   D. 30 to 40 years or more

11. Approximately what percent of the plants and animals on the Endangered Species List have been impacted by invasive species?
   A. 5 to 15 percent
   B. 35 to 45 percent
   C. 60 to 70 percent
   D. 90 to 100 percent

12. Which of the following statements is FALSE concerning invasive species?
   A. Invasive species have high reproductive rates.
   B. Invasive species tend to disperse easily.
   C. Invasive species need a specific set of environmental conditions to become established.
   D. Invasive species often lack natural predators in their new environment.
   E. Invasive species can alter the ecology of an area to the extent that the original ecosystem is fundamentally changed.

13. Which of the following Integrated Pest Management Techniques COULD NOT be used to control an invasive species?
   A. Physical restraints (fences, electric dispersal barriers)
   B. Removal (hand-removal, mechanical harvesting)
   C. Judicious use of chemicals and pesticides
   D. Release of selective biological control agents
   E. All of the above could be used

14. Which of the following is a major source of forest pests?
    A. Solid wood packing materials
    B. Planting exotic ornamental trees
    C. Planting native trees out of their normal habitat range
    D. International travelers
    E. Birds through the dispersal of non-native seeds

15. Which statement best defines an invasive species?
    A. A group of organisms that generally interbreed only among themselves, and show persistent differences from members of allied groups of organisms.
    B. A non-native species, including its seeds, eggs, spores, or other biological material capable of propagating that species.
    C. A non-indigenous species that historically occurred or currently occurs in the ecosystem under consideration.
    D. A non-native species whose introduction causes or is likely to cause economic or environmental harm or harm to human health.
    E. A non-native species whose introduction does not cause economic or environmental harm or harm to human health.

State/Provincial Envirothon
Eco Station Sample Test Questions
Mixed Mesophytic Woodland Eco Station

1. Yellow Poplar (*Liriodendron tulipifera*) is also sometimes known as Tulip Poplar. While these are commonly used names for this tree, neither is particularly accurate, because this tree is not a member of the poplar family. Using the field guides provided, determine to which family this tree belongs.
   A. Liriodendron (Liriodendracea)
   B. Magnolia (Magnoliaceae)
   C. Maple (Aceraceae)
   D. Oak (Fagaceae)
   E. Tulip (Tulipaceae)

2. Yellow Poplar is an example of a "self-pruning" species, meaning that lower limbs die and fall off as the tree grows. Which of the following causes this in Yellow Poplar?
   A. Disease
   B. Lack of adequate moisture during the growing season (drought)
   C. Lack of adequate sunlight
   D. Nutrient-poor soil
   E. Poor air circulation

3. The soil in which this tree is growing has been classified as Brownsville, 14-25 percent slope, north aspect. According to the Soil Survey for Jackson County, what is the major limitation for woodland productivity on this soil?
   A. High content of coarse fragments in the profile
   B. Insignificant restrictions
   C. Restricted root depth
   D. Slope
   E. Stoniness

4. You own property containing Brownsville D-slope and Rigley D-slope soils, and you want to plant Yellow Poplars with the objective of maximizing wood production. On which site are you most likely to meet your objective?
   A. Brownsville north aspect
   B. Brownsville south aspect
   C. Rigley north aspect
   D. Rigley south aspect

5. According to the key provided, for what animal(s) is this tree a major food source?
   A. Gray Squirrel
   B. Gray Squirrel and Ruffed Grouse
   C. Ruffed Grouse
   D. Turkey
   E. White Tail Deer
   F. White Tail Deer and Turkey